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An economic rationale for mental health care reform in the Czech Republic: cost-effectiveness of care for people with psychosis in the community and psychiatric hospitals

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Abstract

Background The absence of economic evidence hinders current reforms of hospital based mental health systems in Central and Eastern Europe. We aimed to assess the cost-effectiveness of care for people with chronic psychoses in psychiatric hospitals compared to discharging patients to the community in the Czech Republic.

Methods We conducted a prospective study of people with chronic psychotic disorders and evaluated the impact associated with discharge into community services as compared to not discharging people from psychiatric hospitals at baseline in the Czech Republic. We measured utilization of services, health related quality of life, met and unmet needs, and global functioning using an adapted Client Services Receipt Inventory (CSRI), EQ-5D-5L, Camberwell Assessment of Need (CAN) and General Assessment of Functioning (GAF). Adjusting for baseline differences between the two groups, we assessed differences in societal costs in Euros (€) and QALYs over a year-long follow-up which we then used to estimate the incremental cost-effectiveness ratio (ICER). We conducted multiple sensitivity analyses to assess the robustness of our results.

Outcomes In our base case scenario, we included 115 patients who were either inpatient or community services users at the baseline. The two groups were very similar in terms of their observed characteristics. The annual QALY was 0.77 and 0.80 in the group discharged to the community at the baseline compared to not being discharged (difference 0.03 95% confidence interval -0.04 to 0.1), but costs were €8,503 compared to €16,425 (difference €7,922, 95% confidence interval 4,371 to 11,472) such that the ICER reached over 250,000 € per QALY. This is considerably above levels that are conventionally considered to be cost-effective and the estimated probability that discharge to the community was cost-effective was very high. None of the sensitivity analyses changed these results qualitatively.

Interpretation This study provides economic evidence for deinstitutionalization by showing that discharge to community care is cost-effective when compared to care in psychiatric hospitals in the Czech Republic. Thus, it adds to the human rights- and clinical- based arguments for mental health care reforms in Central and Eastern Europe.

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Keywords

Psychiatric hospital, Community care, Cost-effectiveness, Deinstitutionalization, Schizophrenia, Psychotic Disorders, Czech Republic

67

68 Background

69 Schizophrenia, schizoaffective disorder and other forms of psychosis are associated with
70 considerable disability. Schizophrenia alone is currently ranked 11th in terms of years lived
71 with disability (YLD) worldwide¹. Psychotic disorders are also associated with high societal
72 costs both in terms of health care costs and productivity losses. A recent systematic review by
73 Jin and Mosweu² reported that, in absolute terms, yearly societal costs for schizophrenia
74 ranged from US\$ 5,818 per patient in Thailand to US\$ 94,587 in Norway or as share of the GDP
75 per capita, from 37% in Switzerland to 214% in the UK.

76 None of the studies included in this review, however, came from Central and Eastern Europe
77 (CEE) where mental health care for people with severe mental illnesses is still predominantly
78 provided in large psychiatric hospitals with limited community-based alternatives. In the
79 Czech Republic, for example, people with schizophrenia are in many cases hospitalized for 5,
80 10 or even 20 years and there are currently more than 8000 psychiatric beds for adults^{3,4}.
81 Historically, this resembles the psychiatric care systems in countries such as England or Finland
82 which have since successfully undergone a process of deinstitutionalisation. In CEE, to date
83 such reforms have been proposed but mostly remain in the realms of rhetoric or aspirations⁵.

84 Research has demonstrated that deinstitutionalization is of benefit to people with severe
85 mental illness and does not bring about serious negative consequences such as increasing
86 homelessness or criminality⁶⁻⁸. Also, studies in a number of European countries have shown
87 that care in the community is not more expensive than care in psychiatric hospitals when both,
88 costs and outcomes of care, were considered^{9,10}. Economic evaluations have played a
89 prominent role in the deinstitutionalization processes in England and other countries, both in
90 terms of providing an impetus for this policy and assisting in its success by means of regular
91 monitoring of its impact¹⁰⁻¹³.

92 In the last 25 years, almost no full economic evaluation of complex interventions for people
93 with severe mental illnesses in CEE was published, which presents a challenge to efforts to
94 reform or improve mental health care systems in the region⁵. Therefore, we aimed to generate
95 such evidence in the context of the current mental health care reforms in the Czech Republic
96 both to inform decision making in this country and as a prelude to further research and

deliberations on deinstitutionalising in the wider CEE region. To that end, we compared the quality of life and societal costs among people with psychosis who had been receiving care in psychiatric hospitals for at least 3 months with patients who had been discharged to the community care in the Czech Republic over a period of a year.

Methods

Study design and comparators

We conducted a prospective study of people with chronic psychotic disorders in the Czech Republic. In order to approximate the impact of deinstitutionalisation on the cost-effectiveness of care, we sought to assess what difference it would have made on average if patients who were long-term psychiatric inpatients (and may eventually be discharged according to current practice) had instead been discharged to receive community care at the start of our study (with the risk of being readmitted at a later stage). In our base case analysis we took societal perspective with respect to measuring costs and a patient perspective with respect to accounting for health outcomes because this was thought to be the most relevant to decision makers. We evaluated these treatment strategies over one year which corresponds to the time horizon over which mental health care services are financed in the Czech Republic. We obtained an ethical approval for this study from both the ethical committee of the Prague Psychiatric Centre (currently the National Institute of Mental Health, Czech Republic) and the ethical committee of Psychiatric hospital Bohnice, Prague, Czech Republic.

Participants and data collection

For the purposes of this study we combined two separate samples: (1) Patients who were under inpatient psychiatric care were drawn from the SUPR project, a broader study aimed at monitoring the current standard of rehabilitative care on long-term wards with a particular focus on implementation of psychosocial rehabilitation principles and interventions on those units¹⁴. For this project, we invited all 17 Czech psychiatric hospitals to participate and, if they consented, asked them to select one or more wards primarily focused on providing care for chronic inpatients with psychosis from which study participants could be recruited; (2) Focussing on multidisciplinary community teams which predominately cared for people with

severe mental illness, we chose eight providers of such care from six (out of a total of 14) Czech administrative regions in an informal attempt to sample services representative in terms of the structure of mental health care and socio-cultural makeup of the Czech Republic. We contacted potentially eligible participants among the respective providers in random order until at least 17 patients per provider consented to participate in the study.

To be included in the study, patients in both samples had to be of working age (i.e. between 18 and 64), had to have been given any diagnosis of non-affective psychosis as defined by the ICD-10 codes F20 to F29, and had to have been in contact with mental health services for at least three months prior to data collection. The cognitive function of patients in the inpatient cohort had to exceed 17 points on the Montreal Cognitive Assessment screening test¹⁵ whereas we assumed that the patients living in the community were of sufficient cognitively ability if they were thought to be able to give informed consent to study participation. After data collection, for our base case analysis we further restricted the community sample to people who had been discharged within less than a year prior to baseline so that our community sample reflected more closely the treatment strategy of interest, i.e. discharge to the community at baseline. We assessed all participants at baseline and then followed them up for a year at approximately 4 month intervals.

Measure of effectiveness

We used the EQ-5D-5L, a self-administered instrument consisting of five dimensions, to assess respondents' health related quality of life at each assessment. Its predecessor, the three level EQ-5D-3L, has been extensively used as an outcome measure in health economic evaluations, particularly in the United Kingdom^{16,17,18}. The five level version of this instrument was developed to improve the sensitivity of this previous three level version, and has been demonstrated to improve instruments' discriminatory power^{16,19}. Although the EQ-5D descriptive system should be used with caution when measuring the impact of psychosis^{20,21}, its value for cost-effectiveness studies in mental health has been well demonstrated²². Each of the health states measured by the EQ-5D-5L has been assigned a preference-based value, known as utility score, that summarises how good or bad each of the health states is on scale anchored by 1 corresponding to full health and 0 corresponding to a state equivalent to death²³. Multiplying this utility score by the length of time spent in these health states yields quality adjusted life years (QALYs) which is a popular measure of health benefit in health

economic evaluation because it enables comparison of cost-effectiveness across disease areas²⁴. We chose the UK tariffs to value health states because no Czech EQ-5D-5L tariffs are available and we deemed UK tariffs to be internationally the most influential²⁴. We used the standard area under the curve method to calculate QALYs²⁵.

As part of the study, two further instruments were measured: First, respondents were interviewed by a person belonging to the staff of the mental health care facility that was trained to administer the Global Assessment of Functioning (GAF) before the beginning of data collection. The GAF is a rating scale ranging from 0 to 100 reflecting the global impression of an individual's social, occupation and psychological function and is thought to have good psychometric properties for a brief instrument after appropriate training in its use²⁶. We did not use GAF scores as a measure of treatment benefit because professionals in psychiatric hospitals who administered this instrument over the course of the follow-up were often different from those assessing GAF at the baseline and had thus not been trained in its use. Second, we assessed clinical and social needs and the degree to which they were met with the Camberwell Assessment of Needs (CAN), a tool developed both for use in clinical practice and research²⁷. We used a 22-item version of the instrument which is filled by both health care professional and user. All the professionals who worked on collecting CAN data for this study had been trained in using this instrument at baseline but again this was not always the case over the follow-up. For this reason and due to the fact that only 11 post-baseline measurements were collected in the hospital cohort, we also chose not to analyse CAN follow-up ratings.

Estimating service use and costs

For the purposes of this study we adapted the commonly used Client Service Receipt Inventory (CSRI) to identify and measure resource use from a societal perspective in a Czech context among patients treated for psychosis and calculated unit costs thereof (see Appendix 1 for details). In short, this involved measuring and costing the use of mental health care services (i.e. psychiatric inpatient, outpatient use), non-healthcare services (i.e. criminal justice costs and community-based care which fall under social care in the Czech Republic) and productivity losses (both to the person with psychosis and their carer). We also collected data on medication use through the CSRI, but this information was not reliable enough for costing purposes in the community sample, so we excluded medication costs in our analysis. However,

good quality data on the medication costs was routinely collected on inpatient wards which gave us an idea of the magnitude of the potential difference between the two groups. We converted all costs in the study to 2016 Euros and, given the time horizon of the study, we discounted neither costs nor effects. Since the CSRI asked for the amount of service use over the month or three months preceding each interview, we linearly inflated the data to cover the entire 4-month period between interviews.

Cost-effectiveness analysis

We divided differences in costs over the follow-up period between the two groups by differences in QALYs to estimate the incremental cost-effectiveness ratio (ICER), a commonly used summary measure of cost-effectiveness. Unless, one of the treatments is both less costly and more effective, to be able to judge whether a treatment is cost-effective, it is necessary to put the ICER in relation to a so-called cost-effectiveness threshold, which has either been regarded to be the willingness to pay for health improvements by the decision maker or what health benefit could be generated if investments were made in a different health intervention, the so-called opportunity cost²⁸. There is no official cost-effectiveness threshold in the Czech Republic (and many other countries), but two approaches have been proposed in the literature to provide some indication regarding their magnitude. The World Health Organisation suggests that an intervention could be cost-effective if the ICER is lower than one to three times a country's GDP per capita (in 2016, approximately €17,000 to €50,000 in the Czech Republic), whereas a more recent approach by Woods et al. implies a threshold between approximately €8,000 and €22,000²⁸⁻³⁰. We illustrate the uncertainty surrounding these cost-effectiveness estimates graphically using two approaches. First, we produce a cost-effectiveness plane (CEP), i.e. a diagram with difference in QALYs on the horizontal axis and difference in costs on the vertical axis displaying the central cost-effectiveness estimate and the uncertainty in terms of these two dimensions³¹. Second, we calculate the cost-effectiveness acceptability curve (CEAC) which, in this case, shows the estimated probability that discharge to the community is cost-effective given the sampling uncertainty³².

Potential confounders

Particularly in observational studies, it is possible that the treatment groups of interest are not comparable because of factors that differ between them which are also causally

associated with the outcomes of interest. More specifically, in the context of this study, we had two concerns: (a) people who were in hospital at baseline could be more unwell than those in the community and this imbalance required reliance on a statistical model to adjust for these differences; (b) It was possible that some subgroups of patients were only present in one cohort but not the other, i.e. there would be a so-called 'lack of overlap' in some variables, such that either extrapolation beyond the observed data would be required or it was necessary to restrict the eligibility criteria to the study further. For example, it was conceivable that patients with severe psychotic symptoms or problematic care needs would only be observed in the hospital sample because this is where adequate care could be provided for them. To reduce this potential bias, we therefore both checked whether there was sufficient overlap between the two groups in terms of selected variables that were measured in the samples and, if necessary, adjusted for these variables in the analysis (see Appendix 2 for our variable selection strategy). In our base case analysis, we chose to adjust for (i) baseline EQ-5D-5L utility score, (ii) the baseline GAF score, (iii) age, (iv) gender, (v) interaction term between the time since discharge from hospital and the community/hospital group indicator.

Statistical analyses

For all our analyses, we used a regression approach to address observed confounding. In our primary analysis, we used a seemingly unrelated regression (SUR) approach to incorporate potential correlation between costs and QALYs into our statistical model³³. To account for missing data, we used a multiple imputation approach which assumes that data was missing at random (MAR), i.e. missingness was unrelated to the unobserved value conditioning on all other variables. In addition, we assumed that, once discharged, patients who were in hospital at baseline had costs of service use equivalent to the community cohort (see Appendix 2 for details). While it was not possible to do so in our SUR model, when analysing QALYs and cost data separately (as well as in other secondary analyses), we used cluster robust standard errors to allow for correlation of outcomes within care facilities and we used a fractional logit model to model QALYs and EQ-5D-5L utilities since, by definition, these are constrained to be smaller than 1 in this study. We used a negative binomial regression model to analyse differences in service use and a random effects logit model to estimate medication use. We performed all statistical analyses in Stata 15³⁴. In line with expected mortality in this

population, one of the study participants died during the study follow-up, however, we considered our sample size too small to warrant the attempt to statistically model survival differences between groups using non-standard methods that adequately account for such rare events^{35,36}. Instead, for simplicity, we treated the data following the death of this patient as missing.

Sensitivity analyses

To assess the sensitivity of the results, we first investigated whether the degree to which we restricted our community sample had any impact by increasing the maximum time between hospital discharge and baseline to two years and to five years. Second, based on evidence by Tulloch et al.³⁷ we used both a quadratic and a linear interaction factor between community care and time since discharge. Third, in addition to the aforementioned potential confounders, we included five CAN items in the analysis, namely whether the patient had any needs in terms of self-care (item 4), psychotic symptoms (item 7), safety to self (item 10) or any substance abuse problems (items 12 and 13 combined) (see appendix 2 for our rationale behind this choice). Fourth, data could be missing not at random (MNAR) rather than MAR, i.e. missingness could be associated with the unobserved value after conditioning on other variables. Hence, we investigated the impact of increasing and decreasing the utility score of time points in which there was missing data by approximately half a baseline standard deviation, i.e. ± 0.1 . Fifth, we excluded patients who did not fulfil the above-mentioned overlap requirement instead of extrapolating results based on the statistical model. Finally, we calculated the cost-effectiveness of the intervention from a government rather than a societal perspective, i.e. we excluded informal care costs and productivity losses, because this may be of relevance to some decision makers.

Results

Participants and descriptive statistics

Overall, 115 patients were included in our base case analysis (see Figure 1). More participants were inpatients at baseline services (n=80, 70%) and more were male (n=68, 59%). For further sociodemographic characteristics see Table 1. Appendix Table A.3.1 shows that, on average, patients who agreed to participate in the community sample had longer length of contact with mental health services and were less likely to be single compared to those who declined to

participate. Appendix Figure A.3.1 shows that the rate of missingness for the potential confounders and outcome measures was markedly higher in patients who were inpatients at baseline and Appendix 2 discusses some of the reasons behind this. Figures A.3.2 and A.3.3 in the appendix show that the two groups were well balanced in terms of most potential confounders, however, self-care needs were somewhat more common among those who were inpatients at baseline and problems with psychotic symptoms were less common. There was some lack of overlap at the upper end of the distribution of GAF scores and at the lower end of the distribution of EQ-5D-5L utility scores. Use of antipsychotics at baseline and over the study follow-up were broadly comparable across the two groups but those who received hospital care at baseline were more likely to use multiple classes of antipsychotics and 2nd generation antipsychotics over the study follow-up (see appendix figure A.3.4).

Costs, QALYs and cost-effectiveness

As shown in Figure 3(b), societal costs over the study follow-up were consistently significantly higher in patients who were on a psychiatric ward at baseline, leading to an overall difference in costs of €7,922 (95% confidence interval (CI) 4497 to 11346). This difference was almost exclusively caused by the cost of inpatient care itself such that the decrease in costs among people who had not been discharged to the community at baseline mirrors the fact that by the end of follow-up approximately half of this group had been discharged (see Figure A.3.5). Costs of social care were somewhat higher in the community cohort and productivity losses slightly lower but, compared to differences in terms of health care costs between the groups driven by the high cost of inpatient care itself, these were insubstantial (see Figure 2). Patients who were in hospital at baseline had a 0.03 (95% CI -0.04 to 0.1) higher QALY over the follow-up but as shown in Figure 3 (a), EQ-5D-5L utility scores remained relatively stable in both arms. The cost-effectiveness plane in Appendix Figure A.3.6 illustrates the joint sampling uncertainty with respect to cost and QALY differences and Table A.3.2 shows the full regression results of the base case analysis. With an ICER of €256,855 per QALY, the QALY gain was not sufficiently high to offset the large difference in costs between the group such that, even at the highest of the thresholds mentioned above (€50,000 per QALY) continued inpatient care was not cost-effective. In fact, the cost-effectiveness acceptability curve in Appendix Figure A.3.7 indicates that even at a willingness to pay as high as €100,000 per QALY the probability that discharge to the community is cost-effective remains above 75%. Table 2 shows that, quantitatively, the

ICER was significantly affected by assumptions regarding the EQ-5D-5L missingness mechanism and how time since discharge was adjusted for in the model. However, even in the scenario most favourable not discharging patients at baseline we obtained an ICER of approximately €110,000 and the lowest probability that discharge to the community was cost-effective was estimated to be 97% such that, qualitatively, the results did not change in any of the sensitivity analyses.

Discussion

This is the first study to provide economic evidence for the mental health care reform in the Czech Republic and could potentially act as a prototype for assessing similar reforms in other countries of CEE. Similar to previous studies, our results show that inpatient care for people with chronic psychosis is costly compared to the care in the community and these differences do not appear to be offset by savings elsewhere. Moreover, the difference in annual costs per patient of €7,922 dwarfed the 0.03 gain in QALYs. The high ICER did not appear to be a result of substandard antipsychotic treatments on psychiatric wards and were robust in our sensitivity analyses. In addition, patients who were discharged within less than one year and inpatients were much more similar in terms of their observed characteristics at baseline than we expected. This supported the comparability between the two groups and suggests that, if appropriately carried out, deinstitutionalisation may be feasible for a large proportion of the current inpatient population. Just like in other countries which have undergone the process of deinstitutionalisation, we do not believe that the results imply that there is no role for inpatient care but that shifting investments towards community care and providing time-restricted inpatient care is likely to give better value for money than long-term psychiatric hospitalisations. This argument adds to the human rights arguments based on the CRPD and especially on its article 19 emphasizing a right to live independently and in the community^{4,38}, and clinical arguments based on long-term favourable outcomes of deinstitutionalized patients in other countries of the world^{6,7}.

In terms of the scope of the study, the construction of the Czech version of the CSRI, calculation of unit costs, review of health service and epidemiological data and building partnership with providers of mental health care in the Czech Republic have been pioneering

and we were able to capture a broad range of cost-drivers and verify the accuracy of data in many cases. For example, although consumption of care was not independently assessed (e.g. by health insurance companies), where possible, we were able to cross-check CSRI data against the records of participating facilities to improve the accuracy of health and social care use data. At the same time, we did not account for the impact of discharge to the community on people other than the patient (e.g. family or partners providing care to the patient) or measure costs of physical health care, housing and pharmaceuticals. Participants were interviewed by a staff member of a mental health care facility upon completion of CSRI. This might have introduced some bias, as participants may have been hesitant to disclose sensitive information, such as contact with the system of criminal justice. In practice, we were also unable to compare the groups in terms of any measure of effectiveness other than QALYs derived from EQ-5D-5L. In addition, in this study we only followed up our participants for a year and we would think that the comparative advantage of discharge to the community care are likely to extend beyond this period thereby potentially improving cost-effectiveness further. Perhaps more importantly, one should keep in mind that we did not evaluate the impact of the reform directly, but we effectively estimated the cost-effectiveness of post-reform care practices compared with the current care practice once the necessary infrastructure and care professionals in the community are in place, i.e. leaving aside setup costs that are likely to be incurred. In addition, in practice, both systems, the old hospital-based and the new community-based one, will have to be run simultaneously for some time.

Several aspects relating to the study design are also relevant to the interpretation of the results and to informing the conduct of future studies of this kind. Although attempts were made to recruit patients from services that captured the regional variations in terms of the structure of mental health care and socio-cultural background of the Czech Republic, we only had limited evidence on whether institutions or participants who declined to participate systematically differed from the one's that would be impacted by the health care reforms and whether this may have led to recruitment bias. Rather than restricting our sample and relying on the correct specification of our statistical model, it would have been preferable to recruit people at the time of discharge to community services. Finally, as in every observational study, although we showed that there were no large differences between the two patient populations in terms of socio-demographic characteristics, health-related quality of life and

functioning, bias may have arisen due to the presence of unobserved confounders and the small sample size of the study limited our ability to adjust for confounding.

Conclusions

We demonstrated that in the Czech Republic, community-based care for people with chronic psychotic disorders is far less costly than care in psychiatric hospitals. We believe that this is yet another argument for pursuing deinstitutionalization in the Czech Republic. The results of this study add to the current modest evidence on the economics of deinstitutionalization^{10,40} and, while one should be cautious in extrapolating the evidence to other CEE countries, the results suggest that deinstitutionalisation may not just be cost-effective in Western countries but also in a mental health care system that is much more similar to those in this region where other evidence is currently lacking⁵ and where there is a lack of evaluative culture⁴¹. We believe that the economic evidence from the present study should be complemented with additional studies looking into economic consequences of the deinstitutionalization which has been proposed in the region. For example, similar to studies conducted in England, Italy, and Germany^{10,42}, economic models of shifting the care from hospitals to communities as well as analyses of differences in costs across providers and regions would be useful. Before implementing this policy, decision makers also need to consider how to finance it. The Czech Republic utilized European Structural and Investment Funds to cover the costs of the first phase of the transition period and this funding opportunity may be open to other EU countries in the region, whereas non-EU countries in CEE may be able to benefit from other sources, such as the cooperation with Swiss Agency for Development and Cooperation. In addition, it would be undesirable if savings in one sector (e.g. health care) would be possible because of partially shifting the costs to another sector (e.g. social care) without appropriate rebalancing of budgets. Following deinstitutionalization, it would be valuable to follow up people in the community to monitor their services use and clinical outcomes in order to assess phenomena which have been associated with deinstitutionalization, such as decrease in (post-discharge) suicides⁴³ and mortality⁴⁴ among patients, increase in revolving door⁴⁵, transinstitutionalization⁴⁶, and satisfaction and quality of life of patients⁶. The studies of this kind should inform the decision making to ensure that the proposed reforms are economically sound, beneficial to patients and sustainable.

Authors' disclosure

Authors' contribution

Petr Winkler initiated, planned and designed the study, coordinated the study, contributed to the analyses and led the writing of the manuscript. Leonardo Koeser conducted the statistical analyses, contributed to the study design and the writing of the manuscript. Lucie Kondrátová participated in designing the study, coordinated data collection and participated in writing of the manuscript. Hana Marie Broulíková calculated unit costs, participated in conducting economic analyses and writing of the manuscript. Marek Páv contributed to the design of the study, coordinated data collection in hospitals and writing of the manuscript. Lucie Kališová contributed to the design of the study and writing of the manuscript. Paul McCrone and Barbara Barrett supervised the whole project from the very beginning and helped to make important strategic decisions.

Ethical considerations

Ethical approval was obtained from the Prague Psychiatric Centre's (predecessor of NIMH CZ) ethical committee and from ethical committee of Psychiatric hospital Bohnice, coordinator of the SUPR project.

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Conflict of interest

Authors declare that they have no conflict of interest.

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Tables and figures

Table 1: Baseline patient characteristics in the base case analysis (N=115)

| Care location at baseline | | Community (N=35) | | Hospital (N=80) | |
|--|--------------------------|------------------|------|-----------------|------|
| Patient characteristic\Summary statistic | | N† | %*,† | N (%*)† | %*,† |
| Gender | Male | 21 | 60 | 47 | 59 |
| | Female | 14 | 40 | 33 | 41 |
| | Missing | 0 | 0 | 0 | 0 |
| Nationality | Czech | 34 | 97 | 74 | 95 |
| | Other | 1 | 3 | 4 | 5 |
| | Missing | 0 | 0 | 2 | 3 |
| Marital status | Single | 19 | 54 | 39 | 62 |
| | Unmarried with a partner | 5 | 14 | 6 | 10 |
| | Married | 1 | 3 | 3 | 5 |
| | Divorced | 10 | 29 | 14 | 22 |
| | Widowed | 0 | 0 | 1 | 2 |
| | Missing | 0 | 0 | 17 | 21 |
| Highest educational attainment | Elementary | 3 | 9 | 26 | 33 |
| | Lower secondary | 20 | 57 | 30 | 38 |
| | Higher secondary | 8 | 23 | 17 | 22 |
| | College education | 4 | 11 | 5 | 6 |
| | Missing | 0 | 0 | 2 | 3 |
| | | | | | |
| Age (in years) | Mean (SD) | 41 | 11 | 42 | 11 |
| | Missing | 0 | 0 | 1 | 1 |
| Years of contact with mental health services | Mean (SD) | 2.5 | 2.7 | 2.1 | 2.2 |
| | Missing | 0 | 0 | 14 | 18 |
| Days since discharge | Mean (SD) | 194 | 104 | n/a | n/a |

*For categories other than 'Missing' the denominator for the percentages is the number of observations without missing data whereas for the 'Missing' category the percentage of missing data as a share of the whole sample is shown

† unless otherwise specified in the second column

SD: standard deviation

Figure 1: Study flow-chart

| Hospital | Care location at baseline | Community |
|---------------|---|-----------|
| 18 | Total number of providers in the Czech Republic | c.20 |
| ↓ | | ↓ |
| 18 | Providers invited for participation in the study | 8 |
| ↓ | | ↓ |
| 11 (13 wards) | Providers who agreed to participate in the study | 8 |
| ↓ | | ↓ |
| Unknown | Patients considered as potentially eligible for the study | 277 |
| ↓ | | ↓ |
| 86 | Patients who consented to participate in the study | 138* |
| ↓ | | ↓ |
| 80† | Patients included in the base case analysis | 35** |

* Reasons for non-participation: not in a good health (N=29), no interest in research (N=29), hospitalised (N=26), concerns about confidentiality of the study (N=22), no longer seen by service (N=13), unable to be reached (N=9), length/frequency of interviews (N=7), lack of cooperation (N=4) (see Appendix Table A.3.1 for comparison of characteristics between participants and non-participants)

** Reason for exclusion: missing data on time from last hospitalisation (N=26), more than 1 year since discharge from psychiatric hospital (N=75)

† Reason for exclusion: missing all follow-up cost and EQ-5D-5L date (N=6)

Figure 2: Unadjusted costs by category over the 12-month follow-up by treatment group (base case analysis)

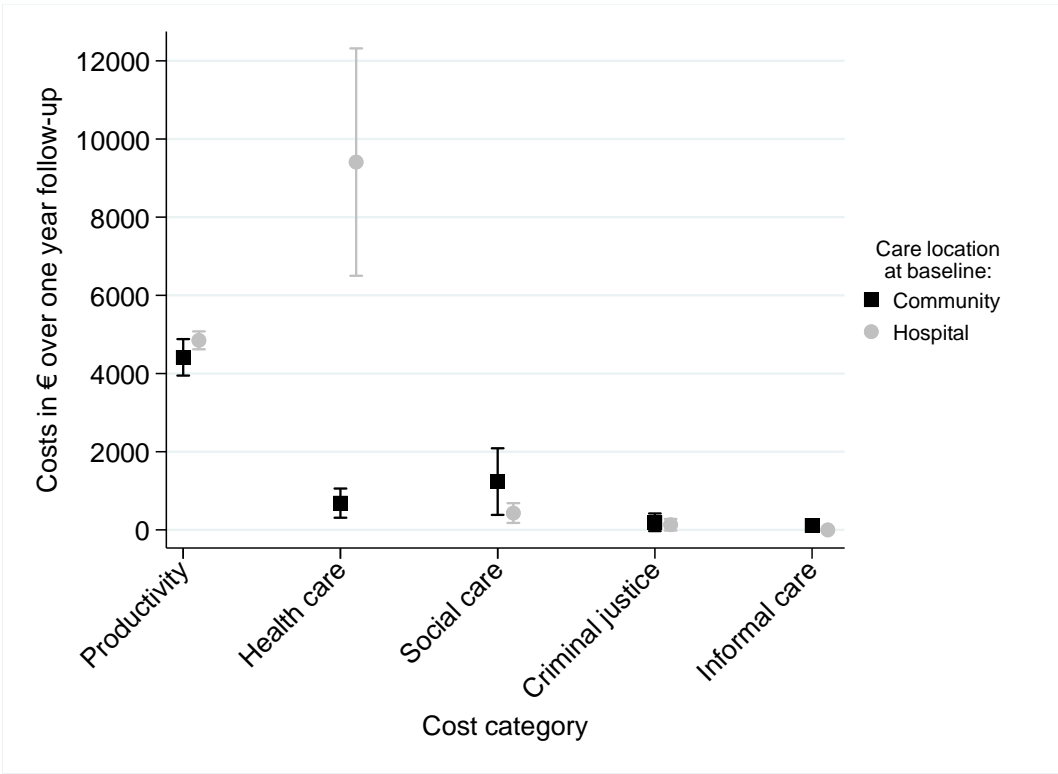
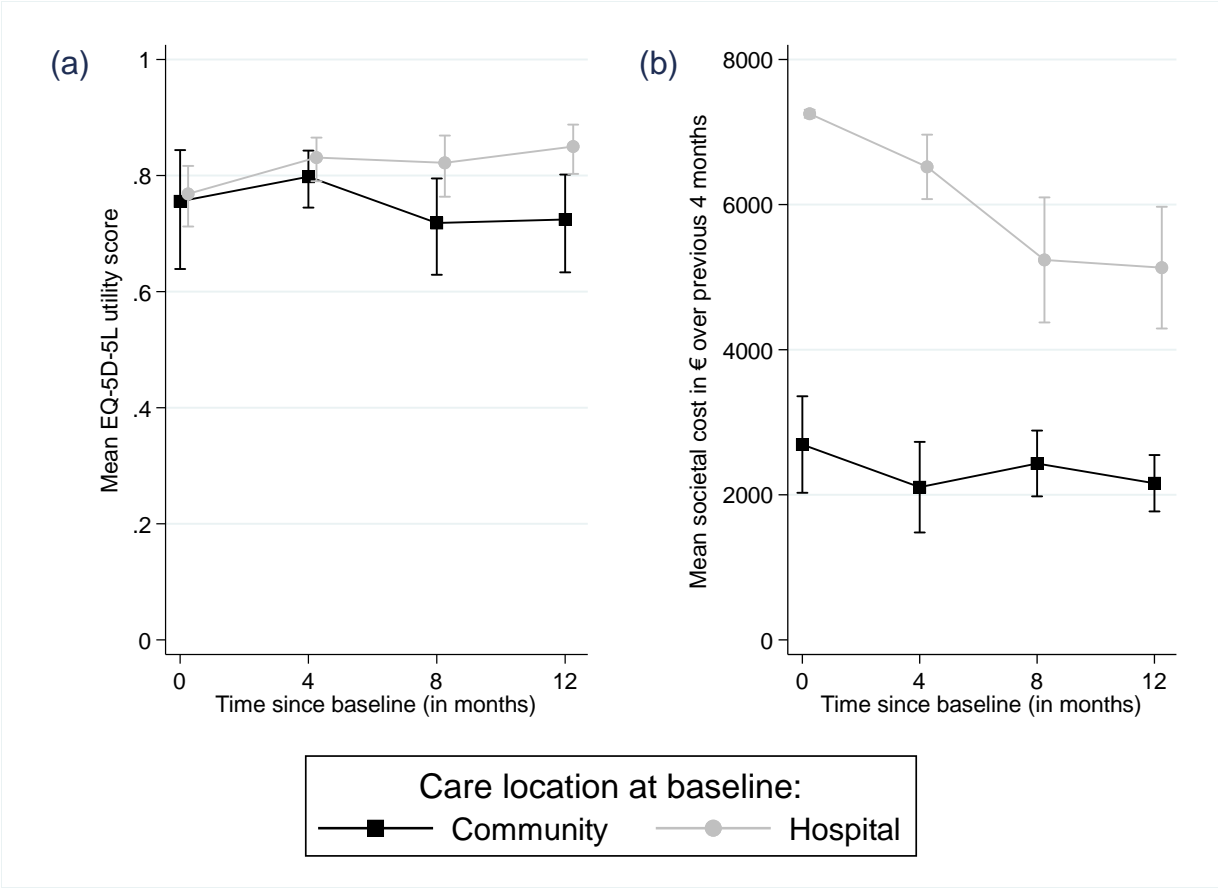


Figure 3: Development of unadjusted (a) EQ-5D-5L utility scores and (b) societal costs over the study follow-up (base case analysis)



561 **Table 2: Difference in costs, quality adjusted life years (QALYs) and cost-effectiveness by analysis scenario**

| | Difference in costs (Not discharged at baseline-discharge to community at baseline) | | | Difference in QALYs (Not discharged at baseline- discharge to community at baseline) | | | Incremental cost- effectiveness ratio (ICER) | Probability of a discharge to the community at baseline being cost-effective at a threshold of €50,000/QALY |
|---|---|-------------------------------|-------|---|----------------------------|------|--|--|
| Scenario | Mean | 95% Confidence Interval | | Mean | 95% Confidence Interval | | | |
| Base case | 7922 | 4497 | 11346 | 0.03 | -0.04 | 0.1 | 256855 | 100 |
| Include patients up to 2 years after discharge | 8684 | 6096 | 11272 | 0.04 | -0.01 | 0.09 | 197573 | 100 |
| Include patients up to 5 years after discharge | 9580 | 7571 | 11588 | 0.06 | 0.02 | 0.1 | 157477 | 100 |
| Adding quadratic interaction term | 6017 | 698 | 11336 | -0.02 | -0.12 | 0.09 | -398752 | 97 |
| Adjusting for CAN items | 7774 | 4234 | 11314 | 0.03 | -0.04 | 0.1 | 263908 | 100 |
| Increasing missing EQ-5D-5L by 0.1 | 7922 | 4497 | 11346 | 0.07 | 0 | 0.13 | 115764 | 97 |
| Decreasing missing EQ-5D-5L by 0.1 | 7922 | 4497 | 11346 | -0.01 | -0.08 | 0.06 | -1174035 | 100 |
| Removing non-overlapping observations | 7867 | 4237 | 11497 | 0.03 | -0.04 | 0.1 | 268784 | 100 |
| Government perspective | 7685 | 4370 | 11000 | 0.03 | -0.03 | 0.1 | 233172 | 100 |

562

Research in context

Evidence before this study

Economic evaluations have been widely used to support deinstitutionalization in a number of European countries. Studies that assessed both, costs and outcomes of mental health care for people with chronic severe mental illnesses, suggested that community care may be more cost-effective than long-stay hospital care. Mental health care reforms in the region of Central and Eastern Europe has remained largely unimplemented and the economic evidence to inform decision making there is almost completely missing.

Added value of this study

This study demonstrates that deinstitutionalization of psychiatric hospitals in the Czech Republic is a reform which is not only in line with EU and WHO policy recommendations, but which is also cost-effective. Although, in our sample, the QALY gain was slightly lower among patients who were discharged to community services when compared to those who stayed inpatient, the annual costs were much disproportionately higher in the inpatient group.

Implications of all the available evidence

The available evidence, which is now based not only on human rights and clinical but also on the economic argument, supports deinstitutionalization in the region of Central and Eastern Europe. Individual countries in the region should look for resources to fund transitional period which might temporarily incur higher costs associated with setting up new services, maintaining both, the old and the new mental health care system, and accommodating needs of deinstitutionalized patients. In order to achieve an optimal balance between costs and outcomes of mental health care in the region, future studies should model various scenarios of mental health care reforms in individual countries.